



RANI DURGA VATI VISWA VIDYALAYA, JABALPUR

Master of Computer Applications (MCA)

CBCS Scheme of Examination as per credit system

MCA First Semester										
Course code	Subject	Periods per Week			Credits	Maximum Marks Theory Slot		Maximum Marks Practical Slot		Total Marks
		L	T	P		End Sem. Exam	Tests(Two)/assignment	End Sem. Practical performance/ viva	Practical Record/ Presentation	
MCA-101	Computer Organization and Assembly Lang. Programming	4	-	-	4	60	40	-	-	100
MCA-102	Programming and Problem Solving (Using C)	4	-	-	4	60	40	-	-	100
MCA-103	Mathematical Foundation of Computer Science	4	-	-	4	60	40	-	-	100
MCA-104	Information Technology	4	-	-	4	60	40	-	-	100
MCA-105	English Language Communication Skills	4	-	-	4	60	40	-	-	100
MCAL-106	Assembly Language Programming Lab	-	-	4	2	-	-	30	20	50
MCAL-107	C Programming Lab	-	-	4	2	-	-	30	20	50
MCAL-108	Numerical Analysis Lab	-	-	4	2	-	-	30	20	50
	Comprehensive Viva-Voce	-	-	-	4 *(Virtual)	-	-	-	-	100
	TOTAL	20	-	12	26+4	300	200	90	60	750

L:Lecture- T:tutorial- P:Practical 1 Credit=1 hr. (Theory) 1 credit=2 hrs. (Practical)

MCA Second Semester

Course code	Subject	Periods per Week			Credits	Maximum Marks Theory Slot		Maximum Marks Practical Slot		Total Marks
		L	T	P		End Sem. Exam	Tests (Two) /assignment	End Sem. Practical performance/ viva	Practical Record/ Presentation	
MCA-201	Data and File Structure	4	-	-	4	60	40	-	-	100
MCA-202	Systems Software	4	-	-	4	60	40	-	-	100
MCA-203	Internet Concepts and Web Design	4	-	-	4	60	40	-	-	100
MCA-204	Financial Management and Accountancy	4	-	-	4	60	40	-	-	100
MCA-205	Software Engineering	4	-	-	4	60	40	-	-	100
MCAL-206	Data and File Structure Lab	-	-	4	2	-	-	30	20	50
MCAL-207	System Software Lab	-	-	4	2	-	-	30	20	50
MCAL-208	Web Design Lab	-	-	4	2	-	-	30	20	50
	Comprehensive Viva-Voce	-	-	-	4 *(Virtual)	-	-	-	-	100
	TOTAL	20	-	12	26+4	300	200	90	60	750

L: Lecture, T: Tutorial, P: Practical, 1 Credit=1 Hr. (Theory), 1 Credit=2 Hrs. (Practical)

MCA Third Semester

Course code	Subject	Periods per Week			Credits	Maximum Marks Theory Slot		Maximum Marks Practical Slot		Total Marks
		L	T	P		End Sem. Exam	Tests (Two) /assignment	End Sem. Practical performance/ viva	Practical Record/ Presentation	
MCA-301	Object Oriented Programming in C++	4	-	-	4	60	40	-	-	100
MCA-302	Relational Database Management System (SQL Programming using Oracle)	4	-	-	4	60	40	-	-	100
MCA-303	Computer Graphics (with Multimedia)	4	-	-	4	60	40	-	-	100
MCA-304	Open Source Software Development	4	-	-	4	60	40	-	-	100
MCA-305	Operating System Concepts	4	-	-	4	60	40	-	-	100
MCAL-306	C++ Programming Lab	-	-	4	2	-	-	30	20	50
MCAL-307	SQL Lab	-	-	4	2	-	-	30	20	50
	Comprehensive Viva-Voce	-	-	-	4 *(Virtual)	-	-	-	-	100
	TOTAL	20	-	08	24+4	300	200	60	40	700

L: Lecture, T: Tutorial, P: Practical, 1 Credit=1 Hr. (Theory), 1 Credit=2 Hrs. (Practical)

MCA Fourth Semester

Course code	Subject	Periods per Week			Credits	Maximum Marks Theory Slot		Maximum Marks Practical Slot		Total Marks
		L	T	P		End Sem. Exam	Tests (Two) /assignment	End Sem. Practical performance/ viva	Practical Record/ Presentation	
MCA-401	Object Oriented Analysis and Design	4	-	-	4	60	40	-	-	100
MCA-402	.Net Technologies	4	-	-	4	60	40	-	-	100
MCA-403	JAVA Programming	4	-	-	4	60	40	-	-	100
MCA-404	Computer Networks	4	-	-	4	60	40	-	-	100
MCA-405	Elective-I	4	-	-	4	60	40	-	-	100
MCAL-406	Java Programming Lab	-	-	4	2	-	-	30	20	50
MCAL-407	.Net Technologies + UML	-	-	4	2	-	-	30	20	50
	Comprehensive Viva-Voce	-	-	-	4 *(Virtual)	-	-	-	-	100
	TOTAL	20	-	08	24+4	300	200	60	40	700

L: Lecture, T: Tutorial, P: Practical, 1 Credit=1 Hr. (Theory), 1 Credit=2 Hrs. (Practical)

MCA Fifth Semester

Course code	Subject	Periods per Week			Credits	Maximum Marks Theory Slot		Maximum Marks Practical Slot		Total Marks
		L	T	P		End Sem. Exam	Tests (Two) /assignment	End Sem. Practical performance/ viva	Practical Record/ Presentation	
MCA-501	Digital Forensics	4	-	-	4	60	40	-	-	100
MCA-502	Fundamentals of Information Security	4	-	-	4	60	40	-	-	100
MCA-503	Advanced JAVA Programming	4	-	-	4	60	40	-	-	100
MCA-504	Cloud Computing	4	-	-	4	60	40	-	-	100
MCA-505	Elective-II	4	-	-	4	60	40	-	-	100
MCAL-506	Digital Forensics Lab	-	-	4	2	-	-	30	20	50
MCAL-507	Advance JAVA Programming Lab	-	-	4	2	-	-	30	20	50
	Comprehensive Viva-Voce	-	-	-	4 *(Virtual)	-	-	-	-	100
	TOTAL	20	-	08	24+4	300	200	60	40	700

L: Lecture, T: Tutorial, P: Practical, 1 Credit=1 Hr. (Theory), 1 Credit=2 Hrs. (Practical)

MCA Sixth Semester

Course code	Subject	Periods per Week			Credits	Maximum Marks Theory Slot		Maximum Marks Practical Slot		Total Marks
		L	T	P		End Sem. Exam	Tests (Two) /assignment	End Sem. Practical performance/viva	Practical Record/ Presentation	
MCA-601	Major Project	-	-	40	20	-	-	200	200	400
	Total	-	-	40	20	-	-	200	200	400

L: Lecture, T: Tutorial, P: Practical, 1 Credit=1 Hr. (Theory), 1 Credit=2 Hrs. (Practical)

Elective-I

EL-405-1	Unix Administration and Shell Programming	4	-	-	4	60	40	-	-	100
EL-405-2	Ethical Hacking	4	-	-	4	60	40	-	-	100
EL-405-3	Cyber Laws & Information Security	4	-	-	4	60	40	-	-	100
EL-405-4	Principles of Compiler Design	4	-	-	4	60	40	-	-	100

Elective-II

EL-505-1	Data Warehousing and Data Mining	4	-	-	4	60	40	-	-	100
EL-505-2	Artificial Intelligence	4	-	-	4	60	40	-	-	100
EL-505-3	Computer Vision and Digital Image Processing	4	-	-	4	60	40	-	-	100
EL-505-4	Bioinformatics	4	-	-	4	60	40	-	-	100

MCA – 101: COMPUTER ORGANIZATION & ASSEMBLY LANGUAGE PROGRAMMING

Max Marks:60
(Min. Passing Marks :40)

UNIT-I

BASIC BUILDING BLOCKS OF COMPUTERS:- Concepts of Boolean Algebra, Logic Gates, Logic Diagrams of Boolean Expressions, Minimization Techniques, SOP(Sum of Products) and POS (Product of Sum) forms, Combinational Circuits, Adders, Subtractors, Multiplexers, Decoders etc., Sequential Circuits, Flip-Flops (SR, D, JK, T), Registers (Shift Register), Counters (Binary, up, down, Ripple).

UNIT-II

BASIC COMPUTER ORGANIZATION:-Block Diagram, Evolution of Computer Systems, Classification of Computers, Data Representation in Computers- Binary, Octal & Hexadecimal Numbering systems and their inter-conversion, Fixed Point and Floating Point representation of numbers, Complements, Alphanumeric Representation, Binary codes-BCD, EBCDIC, Gray, Parity, Error detection and correction codes.

UNIT-III

MEMORY ORGANIZATION:- Types and Organizations, Memory Hierarchy, Semiconductor Main Memory RAM, ROM, Memory Connection to CPU, Auxiliary Memory (Magnetic disks, Magnetic Tapes, RAID etc.), Associative Memory (Hardware Organization, Match Logic, Read/write Operation), Cache Memory (Associative, Direct, Set-Associative Mapping), Virtual Memory (Address Space and Memory Space) Optical Memories (CD-ROM, WORM, DVD-ROM etc.).

UNIT-IV

I/O ORGANIZATION & OVERVIEW OF 8086 CPU:- Commonly used Peripheral Devices, Input-Output Interface, Input-Output Techniques (Programmed Input/Output, Interrupt driven Input/output, Direct Memory Access), Input-Output Processor (IOP). Introduction to Microprocessor, Architecture of 8086/8088 Microprocessor, Software model of 8086/8088 Microprocessor, CPU Registers, Addressing Modes & Instruction Formats of 8086/8088.

UNIT -V

INTRODUCTION TO 8086/8088 PROGRAMMING: Program Structure of 8086/8088 Assembly Language Program, Format of Assembler Instruction, The Instruction set of 8086/8088, Data Transfer, Arithmetic, Logic, Shift and Rotate Instructions. Flag Control Instructions, Compare Instructions, Jump Instructions, Subroutines and Subroutine-Handling Instructions, The Loop and Loop-Handling Instructions, Strings and String-Handling Instructions. Use of Assembly language Instructions for specific programs for typical problems like Table Search, Subroutines, Symbolic and Numeric Manipulations and I/O.

Text Books:-

1. M.MorisMano : Computer System Architecture, PHI Unit-I Page No.1-58., Unit –II Page No. 67-91., Unit –III Page No. 445-483. Unit –IV Page No. 381-423.
2. WatterA.Triebel and Avtar Singh: 8088 and 8086 Microprocessors Programming, Interfacing - Software, Hardware & Application, PHI

Reference Books:-

1. John P. Hayes: Computer Architecture and Organization McGraw-Hill .
2. Andrew S. Tanenbaum : Structure Computer Organization, PHI
3. Albert Paul Malvino : Digital Principles, TMH
4. B.Ram: Microprocessors & Microcomputer, DhanpatRai& Sons.
5. WillamStallings : Computer Organization and Architecture.
6. Yu-Cheng-Liu &Gibson : Microcomputer system, The 8086 family.
7. Peter Norton : Assembly Language for the PC, PHI

MCA – 102: PROGRAMMING AND PROBLEM SOLVING (USING C)

Max Marks:60
(Min. Passing Marks :40)

UNIT-I

An overview: Problem identification, analysis, design, coding, testing & debugging, implementation, modification & maintenance; algorithms & flowcharts; Characteristics of a good program - accuracy, simplicity, robustness, portability, minimum resource & time requirement modularization; Rules/ conventions of coding, documentation, naming variables; Top down design; Bottom-up design.

UNIT-II

Fundamentals of C Programming:History of C; Structure of a C Program; Data types; Constant & Variable, naming variables; Operators & expressions; Control Constructs - if-else, for, while, do-while; Case switch statement; Arrays; Formatted & unformatted I/O; Type modifiers & storage classes; Ternary operator; Type conversion & type casting; Priority & associativity of operators.

UNIT-III

Modular Programming: Functions; Arguments; Return value; Parameter passing - call by value, call by reference; Return statement; Scope, visibility and life-time rules for various types of variable, static variable; Calling a function; Recursion - basics, comparison with iteration, types of recursion- direct, indirect, tree and tail recursion, when to avoid recursion, examples.

UNIT-IV

Advanced Programming Techniques: Special constructs - Break, continue, exit(), goto& labels; Pointers - & and * operators, pointer expression, pointer arithmetic, dynamic memory management functions like malloc(), calloc(), free(); String; Pointer v/s array; Pointer to pointer; Array of pointer & its limitation; Function returning pointers; Pointer to function, Function as parameter; Structure -basic, declaration, membership operator, pointer to structure, referential operator, self referential structures, structure within structure, array in structure, array of structures; Union - basic, declaration; Enumerated data type; Typedef; command line arguments.

UNIT-V

Miscellaneous Features: File handling and related functions; printf&scanf family; C preprocessor- basics, #Include, #define, #undef, conditional compilation directive like #if, #else, #elif, #endif, #ifdef and #ifndef; Variable argument list functions.

Text Books:

1. Kerninghan& Ritchie, "The C Programming Language", PHI
2. Programming in Ansi C by E. Balaguruswamy, TMH, 2004
3. Let us C YaswantKanetkar, BPB publications
4. Gottfried:"Problem solving in C",Schaum Series
5. How to solve it by Computer by R.G. Dromey (P.H.II),1994

Note: Paper is to be set unit wise with internal choice

MCA – 103: Mathematical Foundation of Computer Science

Max Marks:60
(Min. Passing Marks :40)

UNIT-I

Sets, Relations and Functions: Sets, Subsets, Power sets, Complement, Union and Intersection, De Morgan's Law, Cartesian products, Relations, Representing relation using relational matrices, Properties of relations, Equivalence relations, Functions, Injection, Surjection and Bijective mapping composition of functions, The characteristics functions and Mathematical Induction.

UNIT-II

Boolean Algebra: Mathematical Logic, Conjunction, Disjunction and Negations, Basic logical operations, Tautology, Contradiction, Logical Equivalence, Algebra of Proposition, Converse, Inverse and Contra positive proposition, Posets, Lattices, Definition of Boolean Algebra, Atoms of Boolean Algebra, Switching theory of Boolean Algebra.

UNIT-III

Graphs: Introduction, Finite and Infinite graphs Incidence and Degree, Isolated vertex, Pendant Vertex & Null Graphs, Isomorphism between two graphs, Sub graphs, operations on graphs, Walk, Paths and Circuits, Connected graphs, Disconnected graphs and Components, Euler Graphs, Hamiltonian path and Circuits.

UNIT-IV

Trees: Definition and properties of tree, Pendant, Vertices in a tree, Distance and centers in a tree, Rooted and Binary trees, Spanning Trees, Weighted graph, Minimal Spanning Tree in a weighted connected graph, Kruskal's and Prim's Algorithm for finding minimal spanning tree.

UNIT-V

Numerical Analysis: Errors, Solution of Algebraic equations. Finite difference operators, Bisection Method, False position method, Newton Raphson Method, Interpolation, Inverse interpolation, Numerical differentiation and Integration, Trapezoidal rule, Simpsons $1/3^{\text{rd}}$ rule Simpsons $3/8^{\text{th}}$ rule Numerical solution of Ordinary differential equations.

Text Books: -

1. J.P. Tremblay and R. Manohar; Discrete Mathematical Structures with Applications to Computer Science, Tata Mc-Graw-Hill Edition, 1997.
2. E.Balaguruswamy "Numerical Methods." Tata Mc-Graw Hill Co. Ltd. 2000.

Reference Books:-

1. E.V.Krishnamurthy&S.K.Sen “Computer based numerical algorithms.
2. Alan Doerr and Kenneth Levasseur; Applied Discrete Structures for Computer Science, (Asian Student Edition), Galgotia Pub. Ltd., 1996
3. NarsinghDeo; Graph Theory with Applications in Engineering and Computer Science, PHI

Note: - There shall be two questions from each unit in the theory paper and student has to attempt one question from each unit.

MCA-104: INFORMATION TECHNOLOGY

Max Marks:60
(Min. Passing Marks :40)

UNIT I

Information concepts and processing:- Evolution of information processing, data, information, language and communication. Elements of a computer processing system:- Hardware -- CPU, storage devices and media, VDU, input-Output devices, data communication equipment, software – system software, application software.

UNIT-II

Programming Languages:- Classification, machine code, assembly language, higher level languages, and fourth generation languages.

UNIT-III

Operating Systems: - Concept as resource manager and coordinator of processor, devices and memory, concept of priorities, protection and parallelism, Commands Interpreter, Typical commands of DOS/ UNIX/NETWORK, GUI-WINDOWS.

UNIT –IV

Computers and Communication:- single user, multi-user, work station, client- server systems, computer networks, networks protocols, LAN, WAN, Internet facilities through WWW, Mosaic, Gopher, html, elements of Java.

UNIT-V

Information Integrity definition ensuring integrity and computer security:- Perverse software, concepts and component of security, Preventive measures and treatment. Range of application: scientific, business, educational, industrial, national level weather forecasting, remote sensing, planning, multilingual applications.

Text Books:-

1. Sanders, D.H. “Computer Today” Mc-Graw Hill Publisher.
2. Trainer T. et al “Computer” 4th ed. Mc-Graw Hill Publisher.
3. Fundamental of “ Computers” 4th ed. Mc-Graw Hill Publisher.

Note: Paper is to be set unit wise with internal choice

MCA-105: English Language Communication Skills

Max Marks:60
(Min. Passing Marks :40)

UNIT I

Communication: Meaning and process of communication, importance of effective communication, communication situation, barriers to communication. Objectives of communication, types of communication, principles .of communication, essentials of effective communication.

UNIT II

Media of Communication: Written, oral, face-to-face, visual, audio Visual, merits and demerits of written and oral communication..

UNIT-III

Communication Skills: Developing communication skills, Listening, Speaking, Reading-Writing (Oral & Written). Body language; Utility of aids in Communication.

UNIT IV

Spoken Skills: Preparing for oral presentation, conducting presentations, Debates, Seminar, Speeches, Lectures, Interviews, Telephonic Conversation, Negotiations; Group Discussions.

UNIT-V

Written Skills: Preparing of bio-data, seminar, paper, bibliography and official correspondence, Mechanics of writing, Formal & Informal writings, letters, paragraphing, precise, report writing, technical reports, length of written reports, organizing reports, writing technical reports; Creative writing; Common Errors in Language.

BOOKS:

1. Rajendra Pal and J.S. Korlahalli : "Essentials of Business Communication" , Sultan Chand & Sons Publishers, New Delhi.
2. U.S.Rai& S.M. Rai "Business Communications" ,Himalaya Publishing House.
3. Menzal and D.H. Jones "Writing a technical Paper", McGraw Hill, 1961.
4. Strategy and Skill "Business .Communication", Prentice HallNew Jersey, 1987
5. Scot Ober "Contemporary Business Communication", Wiley India.

Note: Paper is to be set unit wise with internal choice.

MCA- 201:DATA AND FILE STRUCTURE

Max Marks:60
(Min. Passing Marks :40)

UNIT- I

Information and its storage representation, nature of information, transmission of information, storage of information, primitive data structure, operations on data structure, integer, real numbers, character information, logical and pointer information, representation and manipulation, storage representation of strings, string manipulation application, text handling analysis.

UNIT- II

Linear Data structure and their sequential representation, Non- primitive data structures, storage structure for arrays, stacks, definition and operations on stacks, application of stack, recursion, polish expressions and their manipulation, Queues, operations on queues, simulation, priority queues, linked storage representation, pointers and linked allocation, linked linear lists, operations on linked lists, circulatory linked list, doubly links list, application of linked lists, polynomial manipulation, linked dictionary, multiple precision arithmetic.

UNIT- III

Nonlinear Data Structures: Trees, definitions and concepts of general trees and binary trees, representation of binary trees, binary tree representation of general tree, binary tree traversal, Threaded binary trees, operation on binary trees, application of trees, binary search trees, evaluation of binary search trees, AVL trees, B.B. trees, M. Way search trees and B-trees, B* trees. (Chapter 8,9,11,12 from Data Management and file Processing by E.S.Lomis) graphs and their representation, matrix representation, list structure, other representation of graphs, Breadth first search, depth first search, application of graphs, dynamic storage management.

UNIT- IV

Sorting and Searching : Notation and concepts, selection sort, bubble sort, merge sort, tree sorts, partition exchange sort, radix sort, address calculation method, Summary of Sorting Methods, Searching Hash-table method, Hashing functions, Collision resolution techniques, external sorting, run list sorting, polyphase sorting, oscillating sorting sorting on disks, generating extended initial runs.

UNIT-V

File Structure: Magnetic tapes, drums, disks, Mass storage devices and their characteristics, record organization, sequential file structure and processing of fixed sequential files (ISAM, direct files, structure and processing, external searching, multilist organization, inverted list organization, controlled list Length, cellular partitioned structures, maintenance of multilist, inverted list, maintenance of constrained list and cellular structures.

Text Books:-

1. J.P.Trembley& P.G. Sorrenson: An Introduction to Data Structures with Application, Mc-Graw Hill.
2. E.S.Loomis: Data Management and File Processing, P.H.I.

Reference Books:-

1. H.W.Sahnis: Fundamentals of Data Structures, Comp. Sc. Press.
2. D.E.Knuth : The Art of Computer Programing,AddisionWesly.

Note: Paper is to be set unit wise with internal choice.

MCA-202: SYSTEMS SOFTWARE

Max Marks:60
(Min. Passing Marks :40)

UNIT – I

Introduction: what is system software, components of system software, evolution of system software, the model of a computer system, translators and loaders, interpreters,

UNIT – II

Elements of assembly language programming, overview of assembly process, design of two pass assemblers, macro and macro processors, Compilers, aspects of compilation, overview of compilation process, programming language grammars,

UNIT – III

Scanning, parsing, storage allocation, compilation of expressions, compilation of control structures, code optimization, compiler writing tools, Interactive Computing and Program Development, Interpreters, incremental compilers

UNIT – IV

Loaders and linkage editors, loading linking and relocation, program relocatability, overview of linkage editing, a linkage editor for IBM PC, linking for program overlays ,

UNIT – V

Software tools, spectrum of software tools, text editors, interpreters and program generators, debug monitor, programming environments

Text Books:

1. D.M.Dhamdhare: System Programming and Operating Systems, 2nd Edition, Tata McGraw - Hill, 1999.

MCA- 203:Internet Concepts and Web Design

Max Marks:60
(Min. Passing Marks :40)

UNIT I

Overview of Internet: Introduction to Internet and WWW, Growth of Internet, Owners of the Internet, Anatomy of Internet, ARPANET, Internet history, Concept of Networking, Brief introduction to Networking models (OSI,TCP/IP), Packet switching, Internet infrastructure, Internet working, Internet protocols and services like TCP/IP, http and WWW, telnet, FTP, Usenet and newsgroup, SMTP and Electronic mail, Internet address and its format URL, domain name, Internet Tools like Web Browsers, Search Engines, Chat & Bulletin Board Services.

UNIT II

Principles and planning of Web Design: Design for the medium: craft the look and feel, portable design, design for low band width, plan for clear presentation and easy access, Design the whole site: smooth transition, grids for visual structure, active white space, Design for the user: design for interaction, location, flat hierarchy, power of hypertext linking, content decision, Design for the screen, Planning the site : site specification, identity and content goal, analyzing audience, building website development team, filename and URLs, Directory structure, diagram the site.

UNIT III

Introduction to HTML: Introduction to HTML, Elements of HTML syntax, Head and Body sections, Building HTML documents, Inserting text, images, hyperlinks, Backgrounds and Color Control, meta tags, ordered and unordered lists, Table Handling: Table layout & presentation, constructing tables in a web page, Frames: Developing Web pages using frames. Forms and its elements, special tags like COLGROUP,THEAD,TBODY, TFOOT,IFRAME,LABEL etc.

UNIT IV

Introduction to JAVASCRIPT: JavaScript variables and data types, statement and operators, control structure object-oriented programming: Functions, Executing deferred scripts, objects, Messaging in a JavaScript: dialog boxes, Alert boxes, confirm boxes, prompt boxes, JavaScript with HTML, Events, Events Handlers, Forms, Forms array.

UNIT V

Site Navigation and Publishing of Website: Crating usable navigation, Using text based navigation: Linking with text based navigation bar, linking to individual files, linking to document/external document fragments, contextual linking, Using graphics based navigation: using text image for navigation, using icon for navigation. Website Publishing: choosing an internet service provider, buying a domain name, using FTP to upload files, Website testing: testing consideration, user testing, feedback form. Refining and updating contents, working with search engines submitting URLs to search engines.

Text Books:-

1. Joel Sklar: Principles of Web Design, Thomson Learning, Vikas Publisher.
2. Thomas A. Powell: HTML complete Reference, TMH

Reference Books:-

1. The Complete Reference Web Design, Thomas A. Powell
2. Internet and Web Design, Vikas Gupta, DreamTech.
3. B Underdahl and K Underdahl, Internet and Web Page/ WebSite Design, Second Edition, 2001, IDG Books India (P) Ltd.
4. D Comer, The Internet Book, Second Edition, 2001, Prentice Hall of India.

Note: Paper is to be set unit wise with internal choice.

MCA- 204: Financial Management and Accountancy

Max Marks:60
(Min. Passing Marks :40

UNIT-I

Meaning and objects of accounting, accounting concepts and conventions, accounting equations, rules of Journalizing; Cash-book, Ledger posting, preparation of trial balance,

UNIT-II

Trading and profit and loss account and balance sheet with adjustments relating to closing stock, outstanding expenses, prepaid expenses , accrued income depreciation, bad debts, provision for bad. debts, provision for discount on-debtors and creditors.

UNIT-III

Inventory pricing , FIFO and LIFO methods; Simple problems of funds flow statement, cost volume, profit analysis.

UNIT-IV

Standard costing, computation of material and labour variances, budgetary control, preparation of cash budget and flexible budget.

UNIT-V

Management control and its characteristics, goals and strategies, structure and control. Responsibility centers and control centers: concepts of Responsibility centers, revenue centers, profit centers and. investment centers, transfer pricing, Responsibility reporting.

BOOKS:

1. Bhattacharya S.K. and Deardan John "Accounting for Management PHI
2. Chadwick "The essence of financial accounting" PHI
3. Chadwick "The essence of Management accounting" PHI
4. Grewal "Introduction to Book -, keeping"
5. Subhash Sharma "Managementcontrol systems" TMH

Note: Paper is to be set unit wise with internal choice.

MCA-205: SOFTWARE ENGINEERING

Max Marks:60
(Min. Passing Marks :40)

UNIT-I

Software Processes: Processes projects and products, Component software processes, characteristics of a software process, software Development Process, project management process, software configuration management process, software configuration management process, process management process.

Software requirement Analysis and Specification: Software requirement, need for SRS, requirement process, problem analysis, analysis issues. Informal approach, structured analysis, object oriented modeling, other modeling approaches, prototyping, requirement specification, characteristics of an SRS, component of an SRS, specification languages, structure of requirement document validation requirement reviews, other method metrics, size measures, quality metrics.

UNIT-II

Planning Software Project:- Cost estimation, uncertainties in cost estimation, building cost estimation models, on size estimation, COCOMO model, project scheduling, average duration estimation, project scheduling and milestones, staffing and personnel planning, rayleigh curve, personnel plan, team structure, software configuration management plans, quality assurance plans, verification and validation, project monitoring plans, risk management.

UNIT-III

Function Oriented Design:-Design principles, coupling, cohesion, design notation and specification, structured design methodology, verification, network metrics, stability metrics, information flow metrics Software Testing.

UNIT-IV

Testing Methods: Software testing fundamentals, test case design, white box testing, control structure testing, black-box testing, testing for specialized environments.

Software Testing Strategies: A Strategic Approach to software testing, strategic issues, unit testing, validation testing, system testing, the art of debugging.

UNIT-V

Re-Engineering : Software re-engineering, software maintenance, a software reengineering process model, reverse engineering, reverse engineering user interfaces, restructuring, code restructuring, data restructuring, forward engineering the economics of reengineering.

Client/Server software Engineering: The structure of client/server systems, software engineering for c/s systems, analysis modeling issues, design for C/S systems, testing issues.

Computer-Aided software Engineering: What is case, building blocks for case, a taxonomy of case tools, integrated case environments, the integration architecture, the case repository.

Text Books:

1. Presman Roger, Software, Engineering: A Practitioner's Approach Tata McGraw Hill, New Delhi.
2. JalotePankaj, An Integrated Approach to Software Engineering Narosa, New Delhi.

Reference Books:

1. R.E. Fairly. Software Engineering Concepts. McGraw Hill, Inc 1985.
2. Poyce, Software Project Management, Addison-Wesly.
3. Sommerville , Software Engineering, Addison-Wesly.

MCA- 301: OBJECT ORIENTED PROGRAMMING IN C⁺⁺

Max Marks:60
(Min. Passing Marks :40)

UNIT- I

Need of object oriented programming, characteristic of object-oriented languages, C⁺⁺ and C basic program construction, output using cout, Preprocessor directives comments integer variables character variables, input with cin, Type float Manipulators, Type conversion, Arithmetic operators, library function.

UNIT –II

Loops, Decisions, Logical operators, Control statement goto, break continue, statement, structures, enumerated data type simple functions, Passing arguments to functions, Returning values from function, Reference arguments, overloaded functions, Inline function, Variable and storage classes.

UNIT- III

A Simple Class, C⁺⁺ object as physical objects, C⁺⁺ objects as data type, constructors Arrays as class member data, objects as function Arguments, Returning objects from functions, Structures and classes, Arrays of objects, strings, operators, Data conversion, pitfalls of operator overloading and conversion.

UNIT- IV

Inheritance, Derived class and Base class, derived class constructors, overriding Member function, class hierarchies, Abstract Base class, Private and Private inheritance, Levels of inheritance, Multiple inheritance, ambiguities in multiple inheritance.
Containership: Classes within classes, pointers , Addresses and Pointers, Pointers and arrays, Pointers and functions pointers and strings, memory management new and delete, Pointers to object.

UNIT- V

Virtual function, friend function, Static functions Assignments and copy initialization, The this pointer Streams. String , I/O, Character I/O, object I/O with multiple objects, file pointers, Disk I/O with member functions, error handling , Redirection command line arguments, Printer output, overloading the extraction and insertion operators.

Text Books :-

1. Object- Oriented Programming in Turbo C⁺⁺ by RobertLaforeGalgotia Publisher.
2. C⁺⁺ Programming (IInd Edi.) by John Thomas Berry (Prenting Hall of India)
3. C⁺⁺ made simple by M.Kumar (Tata McGraw Hill public.)

References Books:-

1. C⁺⁺ Programming (IInd ed.) by JhonThoms Berry (P.H.I.)

MCA-302: RELATIONAL DATA BASE MANAGEMENT SYSTEM (SQL PROGRAMMING USING ORACLE)

**UNIT-IMax Marks:60
(Min. Passing Marks :40)**

INTRODUCTION: -Advantages of DBMS approach, various views of data, data independence, Schema & sub-schema, Primary concepts of data models, Database languages, Transaction management, Database administrator & uses, data dictionary, Overall system architecture.

ER MODEL: - Basic concept, Design issues, Mapping constraints, Keys, ER diagram, weak & strong entity sets, specialization & generalization, aggregation, inheritance, design of ER schema, Reduction of ER schema to tables.

UNIT –II

DOMAIN RELATIONS & KEYS :- Domains, Relations, Kinds of relation, relational databases, various types of keys, candidate, primary, alternate & foreign Keys.

RELATION ALGEBRA & SQL :- The structure, relation algebra with extended operations, Modification of database, idea of relational calculus, Basic structure of SQL, set operation, Aggregate function, Null values, Nested subqueries, Derived relations, views modification of database, Join relations, DDL & SQL .

UNIT– III

FUNCTIONAL DEPENDENCIES & NORMALIZATION: Base definitions, Trivial & non-Trivial dependencies, Closure set of dependencies & of attributes, Irreducible set of dependencies, introduction to normalization, Non- loss decomposition, FD diagram of I, II & III NF, Dependencies prevention, BCNF, Multivalued dependencies prevention's, BCNF, Multivalued dependencies & ANF, Join dependencies & 4 NF.

DATABASE INTEGRITY :-General idea, Integrity rules, Domain rules, Attribute rules, Relation rules, Database rule, assertions, triggers, Integrity & SQL.

UNIT –IV

DISTRIBUTED DATABASES :- Basic idea, distributed data storage, Data replication, Data Fragmentation, horizontal, vertical & mixed fragmentation.

EMERGING TRENDS IN DBMS :- Object – Oriented database- Basic idea & the model Object structures Object, Class, inheritance, multiple object identity, Data warehousing terminology, definitions, characteristics, Data mining & its overview, Database on www, multimedia database difference with conventional DBMS, issues, similarity based retrieval continuous media data, multimedia data formats, video servers.

UNIT- V

NETWORK & HIERARCHICAL MODEL: Basic idea , Data structure diagram, DBTG model, implementation, Tree structure diagram, Implementation techniques, comparison of three models.

TRANSACTION CONCURRENCY & RECOVERY:- Basic concept, ACID properties, Transaction state, Implementation of atomicity & durability concurrent executions, Basic idea of serializability, Basic idea of concurrency control, Basic idea of deadlock, Failure classification, storage structure - types, stable storage implementation, data access, Recovery & Atomicity – Log based recovery, deferred database modifications, immediate database modifications, checkpoints.

Text Books:-

1. Henry F.Korth& A. Silbershatz: Data System Concepts. Mc-GrawHill.
2. Arun K. Majumdar&P.Bhattacharya: Data Base Management System. TMH

References Books:-

1. Bipin C. Desai: An Introduction to Database System, Galgotia Pub. Co.Ltd.
2. Jeffrey O. Ullman: Principles of Database Systems, Galgotia Pub. Co.Ltd.
3. James Martin: Principles of Database Management . PHI
4. James Martin, Computer Database organization. PHI

MCA-303: COMPUTER GRAPHICS (WITH MULTIMEDIA)

Max Marks:60
(Min. Passing Marks :40)

Unit-I

A Brief background about applications of Computer Graphics, Overview of Graphics Systems, Video display devices, Refresh cathode ray tubes, Raster and random scan displays, colour CRT monitors, Flat panel displays, LCDs. Design and architecture of raster scan and random scan display systems. A brief introduction to input devices and hardcopy devices. Output primitives, DDA and Bresenham's 2D line drawing algorithms, Parallel line algorithms.

Unit-II

Midpoint circle generating algorithm, Ellipse generating algorithm, Other curves, Filled area primitives, Scan line polygon fill algorithm, Inside outside test, Boundary fill algorithm, Flood fill algorithm, Character generation, Attributes of output primitive, line and curve attributes, Character attributes.

Unit-III

Anti-aliasing, Two dimensional geometric transformations, Composite transformations, General Composite Transformations and Computational Efficiency, Other transformations, Affine transformation, Two dimensional viewing, Window to viewport coordinate transformation.

Unit-IV

Clipping operations, Cohen Sutherland line clipping, Liang Barsky line clipping, Nicholl-Lee-Nicholl line clipping, polygon clipping, Sutherland Hodgeman and Weiler Atherton Polygon clipping, Text and curve clipping.

Three dimensional concepts, Display methods, polygon surfaces, quadric surfaces and superquadrics.

Unit-V

Three dimensional Geometric and Modelling Transformations, General three dimensional rotation, Three dimensional viewing pipeline, Projections, Parallel and perspective projection, View volume and general Projective transformation.

Visible Surface Detection Methods, Back Face detection, Depth Buffer Method, A buffer method, Depth sorting method.

Text Book:-

1. Donald Hearn and M. Pauline Baker, Second Edition, Prentice Hall of India, 1997. Unit I (pp 35-45, 53-72, 84-92), Unit II (pp 97-112, 117-130, 131-133, 143-152, 163), Unit III (pp 171-174, 183-203, 208, 217-220), Unit IV (pp 224-242, 244, 296-301, 305-313) Unit V (pp 407-423, 432-456, 469-480).

Reference Book:-

1. J.D. Foley, A van Dam, S.K. Feiner, J.F. Hughes, Addison Wesley Publ.Company, 1997.
2. Jim Blinn, Jim Blinn's Corner: A trip Down the Graphics Pipeline, Morgan Kaufman, 2000.

MCA-304: Open Source Software Development

Max Marks:60
(Min. Passing Marks :40)

UNIT-I

Open Source Software Philosophy: Brief History of OSS and free software, The Four Freedoms and their meaning, Introduction to OSS and free software, OSS definition, benefits of OSS, shortcomings of OSS, Examples of OSS, binary code vs source code, difference between proprietary software vs OSS, free software vs freeware., Open standards, The Cathedral and the Bazaar (CatB), Open source movement and rise of Linux, GNU Project, GNU/Linux distributions, Free Software Foundation, Legal aspects, licensing: What is a License; Copyright & Copyleft, Open Source Licenses: GNU, General Public License (GPL), GNU Lesser General Public License (LGPL), GNU Affero General Public License (AGPL), Apache License, MIT, BSD etc. Intellectual Property Right (IPR).

UNIT-II

OSS developers and Communities: Who Participates in the Open Source Process?, Motivation of participants, How OSS Developers Collaborate?, Open source communities, Organization of the Open Source Community, Importance of Communities in Open Source Movement, Alliance formation and Community Development, Roles and responsibilities, The Collaborative Medium and tools, IRC/real-time chat system, wikis, Developing blog, group, forum, social network, mailing lists, Cooperation, coordination and control in OSS, Managing People, Major Open source software and Distributions: Category of Open Source Software, Operating Systems, Middleware, Servers, Desktop Environment, Development Environments, Introduction to the LAMP (Linux, Apache, Mysql and PHP) software bundle (platform/development environment). Case Study some successful FOSS projects: BIND (DNS Server), Apache (Web Server), Mozilla (Firefox), Sendmail (Email Server), OpenSSH (Secure Network Transmission Tool), Open Office (Office Productivity Suite), Linux Foundation, Wikipedia, Joomla.

UNIT-III

Software Engineering and OSS: Open Source and Closed Source Software Development Methodologies, Difference between two styles of development, Cathedral and Bazaar, OSS development process, Stages in open source software development, Overview of various software development models, Life cycles model of traditional software development, Life Cycle Model for Open Source, phases in OSS development, various OSS development models, OSS Pendulum model, development model of Woods et al., model of Roets et al. Open

source system development cycle, Jorgensen life cycle, Mockus model, comparisons of OSSD life cycle with SDLC, Agile vs OSS development, extreme programming, Open source software engineering (requirements, architecture, evolution, testing, reuse, documentation etc.),

UNIT-IV

Bug Tracking in OSS: What is Bug/defect?, Bug management in OSS, Bug tracking and removal, Issue tracking and technical support tools, patch, bug tracker tools (Launchpad, mantis, bugzilla), Version control tools, Concurrent Version System (CVS), Overview of SVN, SVN Commands, TortoiseSVN, centralized vs distributed version control systems, git: a distributed version control system, Starting / participating in OSS: Open Source Software Development, Hosting Facilities and directories, Starting your own open source project, Choosing a project – feature ideas, Providing the ecosystem for your open source project, Accepting contributions, Contributing in OSS, submitting bugs.

UNIT-V

OSS development tools/software: OSS development, source code management, Languages Used to Develop Open Source Products C and C++, Perl, PHP, Python, Java and other languages, cross platform code. Build Systems- Make, Automake, and Autoconf, Ant, Nightly/daily build tools- Apache Gump, CruiseControl, and Maven. Design and Code Generation tools- ArgoUML and Dia used for UML modeling, Quality Assurance Tools- JUnit, PHPUnit, PyUnit, and NUnit, Lint, LCLint, splint, Checkstyle, JCS (Java Coding Standard Checker), Eclipse Metrics Plugin (Metrics), PyCheck, and flawfinder (security/vulnerability checker for C/C++), Codestriker (an online web-based code reviewer).

REFERENCES

1. Feller, J., Fitzgerald, B., Understanding Open Source Software Development, Pearson Education, 2001.
2. Fogel, K., (2005). Producing Open Source Software, How to Run a Successful Free Software Project, Retrieved 26/05/15 from: <http://producingoss.com/en/index.html>
3. Raymond, E., (1999). "The Cathedral and the Bazaar", Knowledge, Technology & Policy, Vol. 12, No 3
4. Joseph Feller, Brian Fitzgerald, Scott A. Hissam, and Karim R. Lakhani. (2005), Perspectives on Free and Open Source Software, The MIT Press Cambridge, Massachusetts London, England, edited by, , 2005
5. Two Case Studies of Open Source Software, Development: Apache and Mozilla, AUDRIS MOCKUS
6. Ben Collins-Sussman et al. "Version Control with Subversion" also available at <http://svnbook.red-bean.com/en/1.7/svn-book.pdf> last accessed on 24/06/2015
7. <http://www.openhub.net/> last accessed 21/05/2015
8. <http://www.sourceforge.net/>
9. <http://www.gitorious.org/>

10. <http://www.launchpad.net/> last accessed 21/05/2015
11. <http://openhatch.org/>
12. <http://code.google.com/gsoc>
13. <http://directory.fsf.org/>
14. <https://www.codeplex.com/>
15. http://www.tutorialspoint.com/junit/junit_test_framework.htm

MCA-305: OPERATING SYSTEM CONCEPTS

Max Marks:60
(Min. Passing Marks :40)

UNIT- I

What is an operating system simple batch system, Multiprogrammed Batched systems. Time-sharing systems, Personal Computer systems Parallel systems, Distributed and Real Time systems, Computer –system operation, I/O structure, storage structure, storage hierarchy, Hardware Protection, General-system Architecture.

UNIT –II

System components, operating – system services Operating System as resource manager, system calls, system programs, system structure, virtual machines, system design and Implementation, system Generation, Process Concept , Process scheduling, operation on process, Cooperating processes, Interposes communications.

UNIT- III

Basic concept of CPU scheduling, scheduling criteria, scheduling Algorithms, Algorithms evaluation, Process synchronization, the critical section problem, synchronization hardware, semaphores, classical problem of synchronization, Critical regions, monitors, Case studies problem of dead lock in processor management, Methods for handling deadlock.

UNIT- IV

Memory management, logical Vs physical Address space, swapping contiguous, Allocation, paging, segmentations, segmentation with paging, Demand paging performance of demand paging. Replacement Algorithm page, Thrashing, Demand segmentation, secondary-storage structure and Disk scheduling algorithms.

UNIT -V

File-system structure, Access methods, Directory structure, protection, Allocation methods, Free-space management, directory implementation, efficiency and performance, Recovery Goals of protection, Domain of protection, Access matrix implementation of Access matrix.

Text Books :-

1. Operating System Concept (IVth ed.) by Silbersantz and Galvin (Addition Wesley)

Reference Books :-

1. Operating system Principles by P. B. Hansen, P.H.I.
2. An introduction to operating system design N. Haberman, Galgotia publication.

MCA-401: OBJECT ORIENTED Analysis & DESIGN

Max Marks:60
(Min. Passing Marks :40)

UNIT-I

The object Model, the evolution of object model, elements of object model, applying the object model, Classes and Objects, Relationships among objects, the nature of a class, relationship among classes, the interplay of classes and objects, on building quality classes and objects (Chapter 2,3 from Grady Booch)

UNIT-II

Advanced object Modeling, Aggregation, Abstract Classes, Generalization as extension and Restriction, Multiple inheritance, Metadata, Candidate Keys, Constraints. Dynamic Modeling – events and states, operations nested state diagrams, Concurrency, Functional Modeling, Data Flow Diagrams, specifying operations, Constraints, Relation of Functional to object and Dynamic Models.

UNIT-III

Design Methodology, OMT as a software engineering methodology, Analysis, overview of analysis, Problem statement, overview of system Design, Breaking a system into subsystems, identifying Concurrency, Allocating subsystems to processes and tasks, Management of data stores, Handling global resources, choosing software control implementation, Handling Boundary condition, setting trade off priorities, Common architectural frameworks.

UNIT-IV

Object Design, overview of object Design, Combining the three models, Design algorithms, Design optimization, implementation of Control adjustment of inheritance, Design of Association, object representation, Physical packaging.

UNIT-V

Implementation, from Design to implementation object-oriented style, Reusability, extensibility, Robustness, Object Oriented languages, Translating a Design into an implementation.

Text Books:

1. Object Oriented Modeling and Design by James Rumbaugh et. el. Edition P.H.I, 1991.
2. Object Oriented Analysis and Design with application. By Grady Booch (IInd ed.)' Addition Wesley (2000).

MCA-402●Net Technologies

Max Marks:60
(Min. Passing Marks :40)

UNIT-I

Introduction to .NET Technology, Introduction to VB.NET, Software development and Visual Basic .NET, Visual Basic .NET and .NET frame.

UNIT-II

Visual Basic fundamentals: The Visual Basic .NET Development . Environment, The element of VB.NET, VB.NET operators, Software design, Conditional structure and control flow, Methods.

UNIT -III

Classes and Objects: Types, Structure and Enumeration, Classes, Interfaces. Exception handling and Classes, Collections, Arrays and . other Data Structure.

UNIT-IV

Advance design concepts, Patterns, Roles and Relationships, Advanced Interface Patterns: Adapters and Delegates and Events Data Processing and I/O.

UNIT-V

Writing Software with Visual Basic .NET, Interfacing with the End User, Introduction to ASP.NET and C#.NET and their features.

BOOKS:

1. Jeffrey R. Shapiro "The Complete Reference Visual Basic .NET Tata Mcgraw Hill (2002 Edition).
2. Rox "Beginner and Professional Edition VB.NET" Tata Mcgraw Hill.
3. Steven Holzner "Visual Basic.NET Black Book" Wiley Dreamtech Publication.
4. Alex Homer, Dave Sussman "P~ofessional ASP.NET1.1" Wiley' Dreamtech .

5. Bill Evzen, Bill Hollis "Professional VB.NET 2003" Wiley Dreamtech .
6. Tony Gaddis "Starting Out VB.NET PROG.2nd Edition" Wiley Dreamtech
7. Chris Ullman, Kauffman "Beg. ASP.NET1.1 with VB.NET 2003" Wiley Dreamtech
8. Chris Ullman, Kauffman "Beg ASP.NET1.1 with VC#.NET 2003" Wiley Dreamtech

MCA –403: JAVA PROGRAMMING

Max Marks:60
(Min. Passing Marks :40)

UNIT-I

Understanding the Internet, what is the Internet, How TCP/IP makes the Internet work, who runs the Internet, Overview of the Internet, Services like E-mail, WWW, FTP, Telnet etc. Domain Name System (DNS), Simple Network Management, Protocols (SNMP), Internet security, Cryptography, Public-key algorithms, Authentication Protocols, Digital Signature, Multimedia, Audio, Video, Data Compression.

UNIT-II

Java History, Java features, How Java differs from C and C⁺⁺, Java and Internet, Java and WWW, Hardware and Software requirements, Java environments, Simple Java Program, Java Program Structure, Java Tokens, Java statements, Implementations a Java Program, Java virtual machine, Constants, variables and data types.

UNIT-III

Operators and expressions, Arithmetic, Relational, Logical Bitwise operators, operator precedence and Associatively various control flow statement like if-else, switch while, do, for etc. classes object and methods, Inheritance extending a Class, Visibility control, Arrays strings and vectors.

UNIT-IV

Interfaces, Multiple inheritance defining Interfaces, extending Interfaces, Implementing Interfaces, Accessing Interface variables, Java API Packages, Naming Conventions, Creating packages, Accessing a package, Adding a class to a package, Hiding classes. Multi threaded programming, Creating threads, extending thread class, life cycle of a Thread, Thread exception, Thread priority.

UNIT-V

Exceptions, exception Handling in Java, Applet programming, Applet life Cycle, creating executable Applet, Applet Tag, Running an applet, passing parameters to applet, Graphics programming, GUI Concepts in Java, managing Input/output files in Java.

Text Books:-

1. Programming with JAVA, A Primer. E. Balaguruswamy Publisher: Tata Mc-Graw Hill publication.

2. Computer Networks By A.S.Tanenbaum, P.H.I.

Reference Books:-

1. The Complete reference Java 2, 3rd Edi. By Patrick Naughton, Herbert, Schild Tata Mc-Graw Hill.
2. Exploring Java : Patrick Nieaneyer and Joshna Peck O, Reilley S Associates, Inc.
3. Hareliy Hahn Teacher the Internets, 1999 By Harley Hahn, P.H.I.
4. Java 2 exam Guide: Barry Boone / William Stanck Tata Mc-Graw Hill.

MCA –404: COMPUTER NETWORKS

Max Marks:60
(Min. Passing Marks :40)

UNIT-I

Users of Computer Network, Network Hardware, Network software, Protocol Hierarchies, Design issue for the layers, Interfaces and services, connection oriented and connection-less services, service primitives, the relationship of services, to protocols, Reference Models, comparison of OSI and TCP/IP Reference models, Data communication services, SMDS, X.25, Frame Relay, Broadband ISDN, ATM and comparison of services.

UNIT-II

Physical layer, Theoretical Basis for data communication, Bandwidth-limited signals. Maximum Data Rate of a Channel, Transmission media, Magnetic media, Wireless, Transmission, The telephone systems, Narrowband and Broadband ISDN and ATM, communication satellites.

UNIT-III

Data Link layer, Design issues, Services provided to the Network layer, error detection and correction, elementary data link protocols, sliding window protocols, Protocol specification and verification, Case studies, HDLC and the Data link layer in the Internet.

UNIT-IV

Network layer design issues, routing algorithms, the optimality principle, shortest path routing, Flooding, Flow-based Routing, Distance-vector and link-state routing broadcast and Multicast Routing, Congestion control algorithms, general principles of congestion control, Traffic shaping, choke packets, load shedding, jitter control.

UNIT-V

The transport layer, The transport service, Quality at service, Transport service Primitives, Addressing establishing a connection, Releasing a connection, Flow-Control and Buffering, Multiplexing, crash Recovery, The Internet Transport protocols, TCP service model, TCP protocol, TCP segment header, TCP connection management, TCP transmission policy, TCP congestion control, TCP timer management UDP.

Text Books:

1. Computer Networks, third edition, 1997 A.S. Tanenbanm, P.H.I.

Reference Books:

1. Data and Computer Communication 1996 William Stallings, P.H.I.

MCA-405: Elective-I

Note: -To see at list of elective papers

MCA-501: DIGITAL FORENSICS

Max Marks:60
(Min. Passing Marks :40)

UNIT-I

Computer forensics and investigations as a profession, Understanding computer forensics, computer forensics versus other related disciplines, A brief History of computer Forensics, Understanding case laws, Developing computer forensics resources, Preparing for computer investigations, Understanding law enforcement agency investigations, Following the legal process, Understanding corporate investigations, Establishing company policies, Displaying warning Banners.

UNIT-II

Windows Systems and Artifacts:Introduction, Windows File Systems, File Allocation Table, New Technology File System, File System Summary, Registry, Event Logs, Prefetch Files, Shortcut Files, Windows Executables.

UNIT-III

Linux Systems and Artifacts:Introduction, Linux File Systems, File System Layer, File Name Layer , Metadata Layer, Data Unit Layer, Journal Tools, Deleted Data, Linux Logical Volume Manager, Linux Boot Process and Services, System V , BSD, Linux System Organization and Artifacts, Partitioning, File system Hierarchy, Ownership and Permissions, File Attributes, Hidden Files, User Accounts , Home Directories, Shell History GNOME Windows Manager Artifacts, Logs, User Activity Logs, Syslog, Command Line Log Processing, Scheduling Tasks.

UNIT-IV

Evaluating Computer Forensics Tool Needs, Types of Computer Forensics Tools, Tasks Performed by Computer Forensics Tools, Tool Comparisons, Other Considerations for Tools, Computer Forensics Software Tools, Command-Line Forensics Tools, UNIX/Linux Forensics Tools, Other GUI Forensics Tools, Computer Forensics Hardware Tools, Forensic Workstations, Using a Write-Blocker.

UNIT-V

Identification of Data: Timekeeping, Forensic Identification and Analysis of Technical Surveillance Devices, Reconstructing Past Events: How to Become a Digital Detective, Useable File Formats ,Unusable File Formats, Converting Files, Investigating Network Intrusions and Cyber Crime ,Network Forensics and Investigating logs, Investigating network Traffic, Investigating Web attacks ,Router Forensics. Cyber forensics tools and case studies.

REFERENCES:

1. Cory Altheide, Harlan Carvey, Digital Forensics with Open Source Tools, Syngress imprint of Elsevier.
2. Bill Nelson, Amelia Phillips, Christopher Steuart, “Guide to Computer Forensics and Investigations”, Fourth Edition, Course Technology.
3. Angus M.Marshall, “Digital forensics: Digital evidence in criminal investigation”, John –Wiley and Sons, 2008.

MCA-502: FUNDAMENTALS OF INFORMATION SECURITY

Max Marks:60
(Min. Passing Marks :40)

UNIT-I

Basics of Communication Systems- Computer Networks types, Transmission Media, Network Topology, Network Protocols, ISO/OSI and TCP/IP Protocol Stacks, Local Area Networks, Wide Area Networks, Internetworking, LAN, WAN and Wireless Networks , The Internet.

UNIT-II

What is Network Security, Security Services, Security Standards, Elements of Security, Security Threats to Computer Networks, Sources of Security Threats, Security Threat Motives, Security Threat Management, Computer Network Vulnerabilities, Sources of Vulnerabilities, Vulnerability assessment, Computer Viruses, Types of viruses, prevention and protection mechanisms-scanning, filtering and blocking, Virus filtering, Contents filtering, Spam,

UNIT-III

Cyber Crimes and hackers, Dealing with Cyber crimes, Hostile scripts, Security Assessment, Analysis and Assurance, Security Requirements Specifications, Threat Identification, Threat Analysis, Vulnerability Identification and Assessment, Security Certification, Security Monitoring and Auditing, Products and Services.

UNIT-IV

Security Access Control and Authorization—Access Rights, Access Control Systems, Authorization, Types of authorization Systems, Authorization principles, Authorization granularity, web access and authorization, Authentication –Authentication elements, Types of authentication, Authentication methods.

UNIT-V

Cryptography, Definition, Symmetric encryption, Public key encryption, Key Management: Generation, Transportation and Distribution, Public Key Infrastructure, Firewalls, Types of Firewalls, Improving Security through Firewalls.

Text Books:

1. Computer Network Security, by Joseph M. Kizza, Publisher: Springer International Edition. 2007

2. Computer Security, 2nd. ed. by Dieter Gollmann Publisher: John Wiley & Sons, 2006 ISBN: 0-470-86293-9
3. Security in Computing, Fourth Edition Author: Charles P. Pfleeger, Shari Lawrence Publisher: Pearson India
4. Cryptography and Network Security Principles and Practices 3rd. ed. by William Stallings Publisher: Pearson Education

MCA-503: Advance Java Programming

Max Marks:60
(Min. Passing Marks :40)

Unit-I

Introduction to Applet and Swing – Creating Applet in Java, Identifying various stages of an Applet life Cycle, various Graphic method in java, the AWT control components, the Swing component class Hierarchy, using top level swing containers , using intermediate level swing containers, using the atomic component, using the Layout Manager, Flow Layout Manager, Border Layout Manager and Grid Layout Manager.

Unit-II

Introduction to Event Handling – Identifying the source of Event, Event Listeners and Event Handlers, the Delegation Event Model, Event classes, Event Listener Interface, Action Listener interface, MouseListener Interface Adapter classes- the Mouse Adapter class, the MouseMotion Listener Interface.

Unit-III

Introduction to JDBC – What is JDBC. Database connectivity , JDBC Architecture, JDBC drivers, Using JDBC API – Loading a Driver, connecting and executing JDBC statement, Handling SQL Exceptions. Accessing Result Sets, method of Result Set interface, Methods of PreparedStatement interface , retrieving row, inserting row, Managing Database Transactions, creating and calling stored procedures in JDBC, using Metadata in JDBC.

Unit-IV

Introduction to JavaBean – javabean concept, software components and javabeans , elements of javabeans, javabean component specification, services of javabean components, types of javabean. Beans development kit, user defined javabeans, creating javabean Applet using BDK, types of javabean properties creating custom Events, Event class, EventListener, Event Handler.

Unit-V

RMI – Overview of distributed Application , Remote Method Invocation, components of RMI application , RMI architecture, RMI Packages, Distributed Garbage collection, creating Distributed application using RMI, creating remote interface, implementing remote interface, creating RMI server, creating RMI client, Running the RMI application, Transmitting files using RMI , client side checks.

Text Books :

1. Mastering Java2 – John Zukowski, BPB Publication
2. Java Programming – Khalid Mughal, Pearson Education.

Reference Books :

1. Advance Java Programming – Amit K. Mishra
2. Black Book – Java Programming – Dreamtech.

MCA-504 CLOUD COMPUTING

Max Marks:60
(Min. Passing Marks :40)

UNIT-I

Introduction: Historical development, Vision of Cloud Computing. Characteristics of Cloud Computing as per NIST, Cloud Computing reference model, Cloud computing environments, cloud services requirements, cloud and dynamic infrastructure, cloud Adoption and rudiments. Overview of cloud applications: EGC Analysis in the cloud Protein structure prediction, Gene Expression Data Analysis, Satellite Image Processing, CRM /and ERP, Social Networking.

UNIT-II

Cloud Computing Architecture: Cloud Reference Model, Types of Clouds, Cloud Interoperability & Standards, Scalability and fault tolerance, Cloud Solutions: Cloud Ecosystem, Cloud Business Process Management, Cloud Service Management, Cloud Offerings: Cloud Analytics, Testing Under Control, Virtual Desktop Infrastructure.

UNIT-III

Cloud Management & Virtualization Technology: Resiliency, Provisioning, Asset management, Concepts of Map reduce, Cloud Governance, High Availability and Disaster Recovery. Virtualization: Fundamental Concepts of Compute, storage, networking, desktop and

Application Virtualization, Virtualization benefits, server Virtualization, Block and file level storage virtualization Hypervisor Management software, Infrastructure Requirements, Virtual LAN(VLAN) and Virtual SAN(VSAN) and their Benefits.

UNIT-IV

Cloud Security: Cloud Information Security Fundamentals, Cloud Security Services, Design Principles, Secure Cloud Software Requirements, Policy Implementation, Cloud Computing. Security Challenges, Virtualization security Management, Cloud Computing SecurityArchitecture .

UNIT-V

Market Based Management of Clouds, Federated Clouds/Inter Cloud: Characterization & Definition, Cloud Federation Stack, Third party Cloud Services.Case Study: Google App Engine, Microsoft Azure, Hadoop, Amazon, Aneka

List of Experiments:

1. Installation and configuration of Hadoop/Euceliptus etc.
2. Service deployment & usage over cloud.
3. Management of cloud resources.
4. Using existing cloud characteristics & services models.
5. Cloud Security Management
6. Performance evaluation of services over cloud.

Recommended Text:

- 1.Buyya, Selvi, “Mastering cloud Computing” TMH Pub
- 2.KumarSaurabh, “couldComputing”, Wiley Pub
- 3.Krutz, Vines, “cloud Security”, Wiley Pub
- 4.velte, “Cloud Computing-A Practical Approach”, TMH Pub
- 5.Socinesky, “Cloud Computing”, Wiley Pub

MCA-505: Elective-II

Note: - To see at list of elective papers

	Security	4	-	-	4	60	40	-	-	100
EL-405-4	Principles of Compiler Design	4	-	-	4	60	40	-	-	100

Elective-II

EL-505-1	Data Warehousing and Data Mining	4	-	-	4	60	40	-	-	100
EL-505-2	Artificial Intelligence	4	-	-	4	60	40	-	-	100
EL-505-3	Computer Vision and Digital Image Processing	4	-	-	4	60	40	-	-	100
EL-505-4	Bioinformatics	4	-	-	4	60	40	-	-	100

EL-405-1: UNIX ADMINISTRATION & SHELL PROGRAMMING

Max Marks:60
(Min. Passing Marks :40)

UNIT I

Introduction to UNIX :what is Operating System, The UNIX Operating System, Knowing Your Machine, The System Administrator, Logging In and Out, Logging In, Logging Out, A Hands-On Session, System Information with date and who, Viewing Processes with ps,

Handling Files, Handling Directories ,UNIX Gets Fragmented, The Internet, The Windows Threat , POSIX and the Single UNIX Specification, Linux and GNU , The UNIX Architecture, Division of Labor: Kernel and Shell, The File and Process ,The System Calls , Features of UNIX, A Multiuser System, A Multitasking System, A Repository of Applications, The Building-Block Approach, Pattern Matching ,Programming Facility,Documentation.

Becoming Familiar with UNIX Commands, Command Basics, The PATH, Where Is the Command?, Command Structure, Flexibility of Command Usage, man, Navigation and Search , Further Help with man -k and man -f , The man Documentation , Understanding a man Page, echo, printf: Alternative to echo, script: Recording Your Session , Using Email with mailx ,Sending Mail, Receiving Mail , mailx Internal Commands ,passwd, uname, who, date, sty, Changing the Settings, The X Window System, The Terminal Emulator, The File Manager.

UNIT II

File System of Unix:TheFile,Ordinary (Regular) File,Directory File, Device File, What’s in a (File)name? ,The File System Hierarchy ,The UNIX File System ,Using Absolute Pathnames with Commands ,The HOME Variable and the Home Directory, pwd and cd: Navigating the File System ,Relative Pathnames , mkdir: Making Directories , rmdir: Removing Directories, ls, ls Options , cp,cp Options ,mv ,rm,rm Options ,cat, more, pico, Navigation,Text Editing, PMx Your UNIX/Linux: The Ultimate Guide, wc, lp, Other Commands in the lp Subsystem od: Viewing Nonprintable Characters ,dos2unix, unix2dos, and Tofrodos, tar, gzip, ip, Other Ways of Using These Commands.

File Attributes: Listing File Attributes ,Listing Directory Attributes (-ld), File Permissions , chmod: Changing File Permissions, Relative Permissions, Absolute Assignment , Recursive Operation (-R), The Directory ,Read Permission ,Write Permission, Execute Permission , umask: Default File and Directory Permissions, File Systems and Inodes , ln: Creating Hard Links, Where to Use Hard Links, In Again, File Ownership, chown, chgrp: Changing Group, How to Handle Intruders, Modification and Access Times, find: Locating Files, Selection Criteria, The find Operators (!, -o, and -a) Operators of the Action Component.

UNIT III

The vi/vim Editor: vi Basics The File .exrc Various vi command for text editing creating and saving files, Recovering from a Crash, Navigation and movement, Editing Text without Operators, Deleting Text, Moving Text, Joining Lines ,Changing Case, Correcting Program, Editing Text with Operators, Deleting and Moving Text , Yanking Text (y, p and P), Changing Text, Copying and Moving Text from One File to Another, Undoing Last Editing Instructions, Searching for a Pattern, Search and Replace, set: Customizing vi, map, abbr.

The Shell, The Shell as Command Processor, Shell Offerings, Pattern Matching—The Wild, The Character, Matching the Dot, Rounding Up, Escaping and Quoting, Escaping in echo, Redirection , Standard Error, Filters—Using Both Standard Input and Standard Output, Collective Manipulation , /dev/null and /dev/tty: Two Special Files , Pipes , tee, Command Substitution, Shell Variables, Shell Scripts, The Shell’s Treatment of the Command Line, xargs: Building a Dynamic Command Line.

UNIT-IV

Process Basics, The Shell and init, ps: Displaying Process Attributes, The Process Creation Mechanism, Inherited Process Attributes , Process States and Zombies, Signal Handling, Job Control, at and batch, cron and crontab. The Shell—Customizing the Environment, Environment Variables, Aliases , Command History , In-line Command Editing, Tilde Substitution, Using set Options, The Initialization Scripts, The C

Shell, Directory Stack Manipulation, Simple Filters, pr: Paginating Files, pr Options, Comparing Files, cmp,comm.,diff, head, tail, cut, paste, sort, uniq, tr, applying filters, Filters Using Regular Expressions—grep and sed, The Sample Database, grep, Basic Regular Expressions , Extended Regular Expressions (ERE) and egrep, sed:The Stream Editor, Line Addressing, sed Options, Context Addressing, Writing Selected Lines to a File (w), Text Editing, Substitution (s), Basic Regular Expressions Revisited, Applying the IRE and TRE.

UNIT-V

Shell Programming- Creation of shell scripts, Interactive scripts, command line arguments, logical operators, conditional execution, The if statement, test commands, compound conditions, case statement, the for loop, while and until, error checking, exit command sleep, wait, trap signals, simple exercises of shell scripts. [Chapter 13 of Unix/Linux ultimate guide by Sumitabha Das.

Books:

1. The Waite groups Advanced UNIX-“a programmer’s” Guide by Stephen Prata, BPB Publication.
2. Your UNIX/Linux: The Ultimate Guide, 3/e by Sumitabha Das, ISBN: 0073376205, McGraw Hill Education.

EL-405-2: ETHICAL HACKING

Max Marks:60
(Min. Passing Marks :40)

UNIT I

Casing the Establishment - What is footprinting- Internet Footprinting. -Scanning-Enumeration -basic banner grabbing, Enumerating Common Network services. Case study- Network SecurityMonitoring

UNIT II

Securing permission - Securing file and folder permission. Using the encrypting file system. Securing registry permissions. Securing service- Managing service permission. Default services in windows 2000 and windows XP. Unix - The Quest for Root. Remote Access vs Local access. Remote access. Local access. After hacking root.

UNIT III

Dial-up ,PBX, Voicemail, and VPN hacking - Preparing to dial up. War-Dialing. Brute-Force Scripting PBX hacking. Voice mail hacking . VPN hacking. Network Devices – Discovery, Autonomous System Lookup. Public Newsgroups. Service Detection. Network Vulnerability. Detecting Layer 2 Media.

UNIT IV

Wireless Hacking - Wireless Footprinting. Wireless Scanning and Enumeration. Gaining Access. Tools that exploiting WEP Weakness. Denial of Services Attacks. Firewalls- Firewall landscape- Firewall Identification- Scanning Through firewalls- packet Filtering- Application Proxy Vulnerabilities . Denial of Service Attacks - Motivation of Dos Attackers. Types of DoS attacks. Generic Dos Attacks. Unix and Windows DoS

UNIT V

Remote Control Insecurities - Discovering Remote Control Software. Connection. Weakness. VNC . Microsoft Terminal Server and Citrix ICA . Advanced Techniques Session Hijacking. Back Doors. Trojans. Cryptography . Subverting the systems Environment. Social Engineering. Web Hacking. Web server hacking web application hacking. Hacking the internet User - Malicious Mobile code, SSL fraud, E-mail Hacking, IRC hacking, Global countermeasures to Internet User Hacking.

REFERENCES:

1. Stuart McClure, Joel Scambray and George Kurtz, “Hacking Exposed Network Security Secrets & Solutions”, Tata Mcgrawhill Publishers, 2010.
2. Bensmith, and Brian Komer, “Microsoft Windows Security Resource Kit”, Prentice Hall of India, 2010.

EL-405-3: CYBER LAWS AND INFORMATION SECURITY

Max Marks:60
(Min. Passing Marks :40)

UNIT-I

Cyber Law: Fundamentals of Cyber Law, History of Internet, Introduction to Indian Cyber Law, Need for Cyber Laws, Jurisprudence of Cyber Law, Objective and Scope of the IT Act 2000, Uncitral Model Law, Intellectual property issues, Overview of Intellectual property related legislation in India Rationale behind Intellectual Property, Underlying premises of IP, Balancing the Rights of the Owner of the IP and the Society, Enforcement of IPRS, IP and Constitution of India Patent, The Patent System, Patentable Invention?, Nonpatentable, Procedure for Obtaining Patent, Copyright, Trademark law, Law related to semiconductor layout and design.

UNIT-II

Security in E-Commerce: E-Commerce Issues of privacy, Security Threats to E – Commerce, Physical Security: Incidents of Physical Security Violations, Disaster and Controls, Basic Tenets of Physical Security, Challenges in Ensuring Physical Security, Physical Entry Controls, Steps to Perform after Physical Security Breach; Spyware Technology: Lock Down USB Ports, Device Lock, Tracking Device; Access Control: Biometrics, Benefits, Criteria for selection of Biometrics, Interoperability Issues, Economic and Social Aspects, Legal Challenges; Digital Signatures: Requirements of Digital Signature System, Components of Digital Signature, Technical issues, Legal issues, Electronic Records, Digital Certificates, Applications of Digital Signatures; Certificate Issuance, Cardholder Certificates, Trader Certificates, Acquirer and Issuer Certificates

UNIT-III

Investigation and Ethics: Cyber crime, Cyber resource Theft, types of cyber crimes/frauds, cyber frauds in India, Cyber jurisdiction, dealing with cyber crimes in various countries, Ethical issues in data and software privacy, Plagiarism, pornography, Tampering computer documents/system hacking, Data privacy and protection, software piracy, social engineering and Phishing, Types of social engineering, exploring methods of phishing; Issues in ethical hacking, Internet security threats: Hacking and Cracking, Malicious code, Viruses, Worms, Trojan Horses; certifying authorities need and power, appointment function, generation, suspension and revocation of certifying authorities; cyber crime forensic.

UNIT-IV

Information Security: Information system, Information Systems, Computer Literacy and IS Literacy, IS Components, Trends in IS, Classification of IS Framework of IS in an Organization, IS and Business Organisation, Human Body as an Information System, IS Failures and Causes, Developing Information System, introduction to various models, Role of security in internet and web services, securing web services, principles of information security, ISMS and its benefits, classification of Threats and attacks, Security Implication for organizations, Information classification and their roles, access control, authentication of hosts, vulnerability, stages of vulnerability management.

UNIT-V

Cryptography: Understanding Cryptography and Encryption, Private Key Encryption, Public Key Encryption, Secret-Key Encryption, Understanding Cryptographic Algorithms: MD5, SHA, RC4, RC5, Blowfish, Understanding Cryptanalysis, Describing Code Breaking Methodologies, Describing Cryptographic Attacks, Firewalls Types of Firewall Techniques, How to Identify a Firewall, Issues in Documents Security, Basic concepts of Network Security, Sniffing, Sniffing Objectives, Protecting from Sniffing Attacks, Perimeters of Network protection and Network attack, Scoping an Attack, Enumerating Network, Querying Registrar, Querying Domain, Querying Network, Interrogating DNS, Exploring Network Reconnaissance, Common Attacks: Wiretaps, Eavesdropping, Portscan, Need of Intrusion

Monitoring and Detection Network-based IDS Host-based IDS, Honeypot Types and Placement, VPN: Insecure Storage of Authentication Credentials by VPN Clients, VPN Fingerprinting, Username Enumeration Vulnerabilities, Offline Password Cracking, Lack of Account Lockout, Denial of Service Attacks, Benefits, Use of Tunnelling with VPN, Authentication Mechanism, Types of VPN, Security Concerns in VPN.

Books:

1. Cyber law and information security by FaiyazAhamed, Dreamtech Publication.
2. Information Security and Cyber laws by Saurabh Sharma, Vikas Publishing House Pvt Ltd.
3. Information Security and Cyber laws by Pankaj Sharma, S.K. Kataria and Sons

EL-405-4:PRINCIPLES OF COMPILER DESIGN

Max Marks:60
(Min. Passing Marks :40)

Unit-I

Compiler and Translators, why do we need translators, the structure of Compiler, Lexical Analysis, Syntax analysis, Intermediate code generation, Book keeping, error handling.

Unit-II

Finite Automata and Lexical analysis, The role of the lexical analyzer, regular expressions, finite automata, from regular expression to finite automata, minimizing the number of states of a DFA, A Language for specifying lexical analyzer, implementation of lexical analyzer using lex.

Unit-III

Context - free grammars, derivation of parse trees, capabilities of CFGs, Parsers, shift-reduce parsing, operators precedence parsing, top -down parsing, Predictive parsing, LR parsers, The canonical collection of LR (0) items, constructing SLR parsing tables, constructing canonical LR parsing tables, constructing LALR parsing tables, Simple parsing exercises using yacc.

Unit-IV

Syntax-directed translations schemes, implementation of syntax- directed translators, intermediate code, postfix notation, parse trees and syntax trees, three-address code, quadruples, and triples, translations of assignment statements, Boolean expressions, statements that alter the flow of control, cost fix translations, translation with the top- down parser.

Unit-V

Symbol tables, the contents of symbol tables, data structures for symbol tables, representing scope information, run time storage administration, implementation of a simple stack allocation schemes, implementation of block- structured languages, storage for block - structured languages.

Text Books:

1. Principles of Compiler Design by Alfred V. Aho., Jeffrey D. Ulman.
2. “Compilers: Principles, Techniques and Tools” Aho, RaviSethi, Ullman, Pearson Education, VIII Ed. 2002.

Reference Books:-

1. Lex and Yacc by Johan R. levine, Tonny Mason, et. al. O” Reilly and Associates.
2. “Compilers Design in C” Allen I. Holub, PHI eastern economy edition 2003.

Note: - There shall be two questions from each unit in the theory paper and student has to attempt one question from each unit.

EL-505-1: DATA WAREHOUSING AND DATA MINING

Max Marks:60
(Min. Passing Marks :40)

UNIT-I

Motivation, importance, Data type for Data Mining :relation Databases, Data Warehouses, Transactional databases, advanced database system and its applications, Data mining Functionalities: Concept/Class description, Association , Analysis classification & Prediction, Cluster Analysis, Outlier Analysis, Evolution Analysis, Classification of Data Mining Systems, Major Issues in Data Mining.

UNIT –II

Data Warehouse and OLAP Technology for Data Mining: Differences between Operational Database Systems and Data Warehouses, a multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology.

UNIT-III

Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation. Data Mining Primitives. Languages, and System Architectures, Concept Description: Characterization and Comparison, Analytical Characterization

UNIT-IV

Mining Association Rules in Large Databases: Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single-Dimensional Boolean Association Rules from Transactional Databases: the Apriori algorithm, Generating Association rules from Frequent items, Improving the efficiency of Apriory, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint-Based Association Mining.

UNIT-V

Classification & Prediction and Cluster Analysis: Issues regarding , classification & prediction, Different Classification Methods, Prediction, Cluster Analysis, Major Clustering Methods, Applications & Trends in Data Mining: Data Mining Applications, currently available tools.

BOOKS:-

1. J., Han and M. Kamber, -Data Mining: Concept and Techniques", Morgan Kaufmann Pub.
2. Berson -Dataware housing, Data Mining& DLAP, @004, TMH.
3. W.H. Inmon - Building the Datawarehouse, 3ed, Wiley India.
4. Anahory, "Data Warehousing in Real World", PearSon Education.
5. Adriaans, "Data Mining", Pearson Education.
6. S.K. Pujari, -Data Mining Techniques", University Press, Hyderabad.

Note:- Paper is to be set unit wise with internal choice.

EL-505-2: ARTIFICIAL INTELLIGENCE

Max Marks:60
(Min. Passing Marks :40)

UNIT-I

What is Artificial Intelligence, what is an AI technique, criteria for success, Problems, problem spaces and search, Production system, Problem characteristics, Hill-climbing, Best-First search, AO algorithm, constraint satisfaction.

UNIT-II

Natural language Processing, Introduction, overview of linguistics, Grammars and language, Basic Parsing techniques, Semantic analysis and representation, structure, Natural Language generation, Natural Language systems (Chapter 12, Dan w Paterson).

UNIT-III

Knowledge Representation Issues, Approaches to knowledge Representation, Representing simple facts in logic, computable functions and predicates, Procedural vs declarative knowledge, forward vs Backward Reasoning matching, control knowledge.

UNIT-IV

Expert systems, Rule-Based system architecture Non-production system Architecture, dealing with uncertainty, knowledge acquisition and validation, knowledge system Building tools. (Chapter 15, Dan W Patterson).

UNIT-V

Pattern Recognition, Recognition and classification process, learning classification Patterns, Recognizing and understanding speech.

Text Books:

1. Artificial Intelligence Elaine Rich and Kevin Knight Tata Mc-Graw Hill Edition.
2. Introduction to Artificial Intelligence and expert system. Dan. W. Patterson Prentic –Hall of India.

Reference Books:

1. Principles of Artificial Intelligence by Nils J. Nilson (Narosa Publication).

EL-505-3: COMPUTER VISION AND DIGITAL IMAGE PROCESSING

Max Marks:60
(Min. Passing Marks :40)

UNIT-I

Introduction: The role of Computer Vision, applications, successes, research issues; its relationship to natural vision, basic image properties. Digital image representation, fundamental steps in image processing, elements of digital image processing systems digitization, Display and recording devices.

UNIT-II

Digital Image fundamentals: A simple Image model. Sampling and quantization, Relationship between pixel, imaging geometry, image transformation, introduction to fourier transformation, Discrete fourier transformation, fast fourier transformation.

UNIT-III

Image Enhancement: Histogram processing, image subtraction, image averaging, smoothing filters, sharpening filters, enhancement in frequency domain, low pass filtering, high pass filtering.

UNIT-IV

Image Encoding & Segmentation: Segmentation, detection of discontinuation by point detection, line detection, edge detection. Edge linking & Boundary Detection: Local analysis, global by Hough transform & Global by graph theoretic techniques.

UNIT-V

Image Representation and Description: Chain codes, polygonal approximation, signatures, boundary segments, boundary descriptors, regional descriptors, introduction to image understanding. Motion Tracking, Image differencing, Feature matching, Optic flow

BOOKS:

1. Gonzalez and Woods "Digital Image Processing", Addison Wesley
2. Gonzalez and Woods "Digital Image Processing using MATLAB", Addison Wesley
3. SchalKoff: Digital Image Processing & Computer Vision, Addison Wesley.
4. M. Sonka et.al : Image Processing and Machine Vision, Prentice Hall.
5. Ballard & Brown: Computer Vision, Prentice Hall.
6. Jain A. K. Fundamentals of Digital Image Processing, PHI
7. Boyle and Thomas, "Computer Vision - A First Course" 2nd Edition, ISBN 0-632-028-67X,Blackwell Science 1995.
8. Low, "Introductory Computer Vision and Image Processing", McGraw-Hill 1991, ISBN 0-07-707403-3

EL-505-4: BIOINFORMATICS

Max Marks:60
(Min. Passing Marks :40)

UNIT-I

Fundamentals of Bioinformatics and Information Technology : Introduction to bioinformatics, experimental sources of biological data fundamentals of molecular biology available databases operating system, including windows and Unix networks-including the intranets and the Internet.

Analytical science and Bioinformatics : High throughput sequencing, experimental determination of protein structures, Gene expression monitoring, proteomics, metabiomics.

UNIT-II

Protein Information resources : Introduction, biological databases, primary sequence databases, composite protein sequence database, secondary databases, composite protein pattern databases, structure classification databases, web addresses.

Genome information resources : Introduction, DNA sequence databases, specialised genomic resources.

DNA Sequence analysis : Introduction, why analyse DNA, Gene structure and DNA sequences, features of DNA sequence analysis, issues in the interpretation of EST searches, two approaches to gene hunting, the expression profile of a cell, cDNA libraries and ESTs, different approaches to EST analysis, effects of EST data on DNA databases.

UNIT-III

Pairwise alignment techniques : Introduction, database searching, alphabets and complexity, algorithms and programs, comparing two sequences a simple case, sub-sequences, identity and similarity, the dotplot, local and global similarity, global alignment the needleman and Wunsch algorithm, local alignment the Smith Waterman algorithm, dynamic programming, pairwise database searching.

Multiple sequence alignment : Introduction, the goal of multiple sequence alignment, multiple sequence alignment a definition, the consensus, computational complexity, manual methods, simultaneous methods, progressive methods, database of multiple alignment, searching databases with multiple alignments.

Secondary database searching : Introduction, why bother with secondary database searches, what is a secondary database.

UNIT-IV

Bioinformatics tools : Visualisation of sequence data, sequence alignment, homology searching, including BLAST, gene expression informatics, introduction to gene finding.

Building a sequence search protocol : Introduction, a practical approach, when to believe a result, structural and functional interpretation.

Analysis packages : Introduction, what's in an analysis package, commercial databases, commercial software, comprehensive packages, packages specialising in DNA analysis, intranet packages, internet packages.

UNIT-V

Applications and commercial aspects of Bioinformatics: Drug discovery, genetic basis of disease, personalised medicine and gene-based diagnostics, legal, ethical and commercial ramifications of bioinformatics.

Perl Programming : Data manipulation, file maintenance, pipelining, packaging and interfacing system facilities. Macromolecular

Modelling and Chemoinformatics : Acquisition of chemical information, including molecular structure from databases visualisation of molecules simulation of molecular interaction introduction to industry standard modelling software.

BOOKS:

1. Attwood TK & Parry-smith DJ "Introduction to Bioinformatics" 2001, Pearson Education Asia.
2. Setup Joao & MeidanisJoa "Introduction to computational Molecular Biology" PWS Publishing Company, 1997 (An international Thouson publishing company).
3. Andreas D. Baxevan's & B.F. Francis Quellette, "Bio Informatics: A Practical guide to the analysis of Genes & Proteins", Second edition 2001, A John wiley & Sons.
4. Martin Tompa Lechre notes on Biological sequence Analysis, Department of Computer Science & Engineering, university of wasnington, seattle USA <http://www.cs.washington.edu/education/courses/527/oowi/>
5. Jean Michael "Bioinformatics : A beginner's Guide", Wiley India.